TWO NEW INDO-PACIFIC SPECIES OF *MORUM* (GASTROPODA: TONNACEA)

William K. Emerson
American Museum of Natural History
New York, New York 10024

ABSTRACT

Morum (Oniscidia) macdonaldi, *n. sp. (type locality Kwajalein Atoll, Marshall Islands) and* M. (O.) joelgreenei, *n. sp. (type locality, Gulf of Davao, Mindanao Island, Philippines) are described. The former taxon represents the first Micronesian record for the genus* Morum *in the western Pacific Ocean. Nineteen living species of* Morum (sensu lato) *are now known (13 in the Indo-Pacific, two in the eastern Pacific, and four in the western Atlantic). Some of these taxa are poorly known and require additional study.*

Although the genus *Morum (sensu lato)* was more widely distributed during the Tertiary with species known from Europe, India, Indonesia, New Zealand, Japan, and the Americas (from Florida to Peru), the surviving members of the subgenera *Oniscidia* and *Herculea* are best represented in the western Pacific Ocean. Here most of the species live in the waters off the Old World continent, ranging from southern Japan, the Ryukyu Archipelago, Taiwan, to the Philippines, and are found in the southwestern Pacific waters in New Guinea, New Caledonia, and eastern Australia. One species *(Morum ponderosum),* however, occurs in the south-central Pacific at Pitcairn Island; it is also recorded from the Ryukyu Archipelago, New Caledonia, and off Queensland, Australia. With the discovery of the new species described herein from the Marshall Islands, the genus is now known from Micronesia. In contrast, the discovery of another new species in the Philippines is not unexpected, as many new and otherwise interesting mollusks have been recently recovered in this archipelago by industrious collectors.

In addition to the two species described below, the following Recent species of *Morum* are known, 1. Indo-Pacific, *M. (Oniscidia): cancellatum* (Sowerby, I, 1824); *exquisitum* (Adams and Reeve, 1848); *grande* (A. Adams, 1855); *macanbrewi* (Sowerby, III, 1889); *praeclarum* Melvill, 1919; *bruuni* Powell, 1958; *teramachii* Kuroda and Habe, *in* Habe, 1961; *uchiyamai* Kuroda and Habe, *in* Habe, 1961; *watsoni* Dance and Emerson, 1967; *kurzi* Petuch, 1979; *M. (Herculea) ponderosum* (Hanley, 1858). 2. Eastern Pacific, *M. (Morum) tuberculosum* (Reeve, 1842); *M. (Oniscidia) veleroae* Emerson, 1968. 3. Western Atlantic, *M. (Morum) oniscus* (Linné, 1767); *M. (Oniscidia): dennisoni* Reeve, 1842); *strombiformis* (Reeve, 1842); *matthewsi* Emerson, 1967.

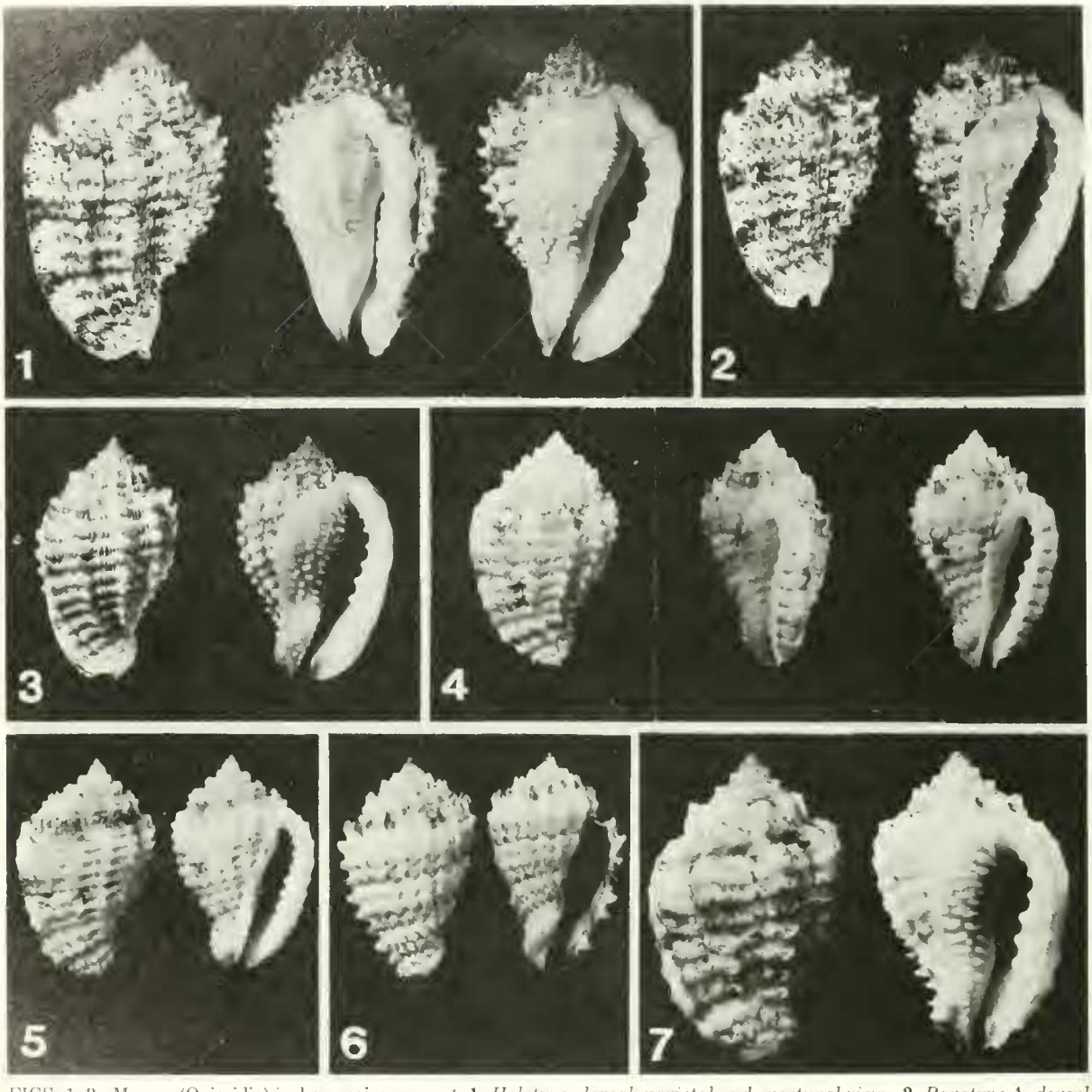
One or two of these nominal species are perhaps best considered a *nomen inquirendum,* until additional specimens can be obtained. A few others require anatomical study in order to determine their biological validity.

Family *Cassidae* Swainson, 1832
Genus *Morum* Röding, 1798

Type species by monotypy: *Morum purpureum* Röding, 1798 [=*Strombus oniscus* Linné, 1767], Recent, western Atlantic. *Morum s.s.* is represented by a few Plio-Pleistocene to Recent, New World species with knobbed, subcylindrical shells.

Subgenus *Oniscidia* Mörch, 1852

Type species by monotypy: *Oniscia cancellata* Sowerby, I, 1824, Recent, Indo-Pacific (See I.C.Z.N. Opinion 1040, 1975). Represented by several Eocene to Recent, largely world-wide species with extended spires and cancellate



FIGS. 1–3. Morum (Oniscidia) joelgreenei *n. sp.* × *1.* **1**, *Holotype, dorsal, parietal and apertural views.* **2**, *Paratype A, dorsal and apertural views.* **3**, *Paratype B, dorsal and apertural views.*
FIGS. 4–6. Morum (Oniscidia) macdonaldi, *n. sp.*, × *2.* **4**, *Holotype, dorsal, parietal, and apertural views.* **5**, *Paratype A, dorsal and apertural views.* **6**, *Paratype B, dorsal and apertural views; note immature apertural characters.*
FIG. 7. Morum (Oniscidia) kurzi *Petuch, 1979.* × *2; Delaware Mus. Nat. Hist. no. 126393; holotype, dorsal and apertural views. All photographs by S. S. Horenstein.*

sculpture of broad axial ribs and narrower spiral cords.

Morum (Oniscidia) joelgreenei,
new species
Figs. 1–3

Description– Shell triangularly ovate, moderately stocky with a wide shoulder, attaining 46+ mm (holotype, fig. 1); spire extended; protoconch of 3½ smooth whorls, erect and papillate; 5+ postnuclear whorls cancellated, with 10 moderately weak spiral cords, crossed by 10 conspicuous, spinose axial ridges (varices) per

whorl; juncture of spiral cords and varices with a sharp, hooked spine; spines most prominent at the shoulder; intervarical areas with 8 to 10 evenly spaced axial lamellae; parietal shield large with outer margin raised and covered with numerous pustules; parietal pustules linear near the aperture, pimplelike on the outer margin; outer lip thickened, crenulated and toothed; 9 primary teeth form linear bifid projections on the inner labial margin, secondary teeth confined to postmarginal surface; anal sulcus shallow; siphonal canal short, recurved, open.

Color–Nucleus shiny, light-tan; postnuclear whorls with whitish base color, overlaid with flecks of reddish brown; 4 widely interrupted brownish spiral bands on body whorl (1 band on shoulder, 2 on either side of midbody area, 1 near the base); darkest coloration of bands on side facing apertural face of each varical spine and on edge of outer lip; bands more defused in Paratype B; parietal shield glazed, buff color with posterior surface tinged a pale lavender-white; pustules white; outer lip glazed, buff color with dark-brown blotches (4 major blotches formed at labial base of spiral bands and 2 secondary blotches between each spiral band).

Material examined–Holotype A.M.N.H. 203719 (fig. 1), 46.4 mm in length, 29.8 mm in width; Paratype A, A.M.N.H. 201362 (fig. 2), 39.4 mm in length, 26.1 mm in width (both *ex*-Joel Greene collection from type locality); Paratype B, (fig. 3), 35.3 mm in length, 22.8 mm in width (William Bledsoe collection, from Panglao, Bohol Island, Philippines, from tangle nets, in 146 meters, June 1980).

Type locality–Davao Gulf, Mindanao Island, Philippines, netted in 200 meters in 1980 by Filipino shell fishmen.

Distribution–Known only from Davao Gulf and Bohol Strait.

Etymology–Named for Joel Greene, an avid collector and a purveyor of shells.

Remarks–This species is reminiscent of the western Atlantic species *Morum (Oniscidia) dennisoni* (Reeve, 1842; Dance and Emerson, 1967, p. 93–94, pl. 12, figs. 5–7), but differs in details of the sculptural ornamentation and in the coloration of the aperture and parietal shield. *Morum (O.) exquisitum* (Adams and Reeve, 1848), a species also known only from Philippine waters (Emerson, 1977, p. 83, 84, figs. E, F, J), has a more robust shell, with stronger and more numerous axial ribs, and a purplish pink parietal shield and outer lip. *Morum (O.) kurzi* Petuch (1979, p. 7, figs. 10–13), recently described from the Philippine Islands, has a smaller shell with coarser sculpture and an orange-colored parietal shield and outer lip (fig. 7). The Sino-Japanese species, *M. (O.) macandrewi* (Sowerby, III, 1889; Habe, 1964, p. 67, pl. 20, fig. 4), has coarser sculpture, stronger banding, with a white parietal shield and a white outer lip bordered with numerous dark blotches on the outer labial rim.

Morum (Oniscidia) macdonaldi, new species

Figs. 4–6

Description–Shell somewhat pyriform, broadly shouldered, small for group, attaining 17+ mm in length (holotype, fig. 4); spire weakly extended; protoconch of 3 whorls, erect and papillate; 4+ postnuclear whorls cancellated, with 12 strong spiral cords, crossed by 16 prominent axial ridges (varices); juncture of spiral cords and varices with a blunt, weakly hooked spine, spines most conspicuous at the shoulder; intervarical pits with 6 to 10 weakly raised striae; parietal shield small, largely confined to columella wall, with outer margin raised and covered with numerous small pustules, mostly pimplelike; outer lip narrowly thickened, crenulated and toothed with about 10 major denticles on the inner labial surface; 3 minor denticles near anterior end of siphonal canal; anal sulcus weakly notched; siphonal canal short, gently recurved, open.

Color–Nucleus shiny, pinkish-tan; postnuclear whorls with creamish tan base color, 4 discontinuous purplish-brown bands on body whorl (1 band on shoulder, 2 on either side of midbody area, and 1 near the base; bands less interrupted on paratype with juvenile aperture (fig. 6); darkest coloration of bands on the apertural sides of varical spines and at base of outer lip; parietal shield poorly glazed, with white pustules; labial margin white, not blotched.

Material examined–Holotype A.M.N.H.

203713, 17.3 mm in length, 10.8 mm in width (fig. 4); Paratype A, A.M.N.H. 203714, 16.1 mm in height; 9.5 mm in width (fig. 5); Paratype B, A.M.N.H. 203715, 15.8 mm in length, 10.2 mm in width (fig. 6); Paratype C, A.M.N.H. 203716, 15.9 mm in length, 10.1 mm in width (all *ex*-D. J. MacDonald collection); 2 Paratypes, D. J. MacDonald collection.

Type locality—West reef of Kwajalein Atoll, between the islands of Kwajalein and Ninni, Marshall Islands, in about 15 meters, on sandy rubble under coral boulders, along the ocean side dropoff of the fringing reef (*teste* D. J. MacDonald, February 23, 1981).

Distribution—Known only from the type locality.

Etymology—Named for the collector, D. J. MacDonald. He recognized the uniqueness of this discovery and submitted specimens to Robert W. Morrison, who in turn kindly transmitted the material to me for study.

Remarks—Somewhat resembling a tiny, immature *Morum (O.) macandrewi* (Sowerby, III, 1889), this distinctive species is the first representative of the genus reported from the Marshall Islands. The molluscan fauna of these atolls is well known (*e.g.* Dietrich and Morris, 1953; Brost and Coale, 1971). The difficulties of collecting on the ocean side of the reefs and the diminutive size of the shells undoubtedly have contributed to the failure to find specimens in the past. No specimens were obtained inside the lagoon. Mr. MacDonald reports examining about a dozen specimens, including two living ones discovered at night on patches of sand near coral rubble. None of the six specimens recorded here were live-taken, but several were obtained in a well-preserved condition, as is the case of the holotype and the figured paratypes.

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AGE RELATIONS AND ZOOGEOGRAPHIC IMPLICATIONS OF LATE PLEISTOCENE MARINE INVERTEBRATE FAUNAS FROM TURTLE BAY, BAJA CALIFORNIA SUR, MEXICO

William K. Emerson[1], **George L. Kennedy**[2], **John F. Wehmiller**[3], and **Everly Keenan**[3]

ABSTRACT

Two Pleistocene marine terraces at Turtle Bay, northwestern Baja California Sur, Mexico (27.7° N. lat.) have been dated at approximately 120,000 and 95,000 years B.P. on the basis of amino-acid racemization in fossil mollusks. These ages imply a correspondence to the early and middle-to-late parts, respectively, of marine oxygen-isotope stage 5. Faunal differences between the upper (24-27 m), 120,000-B.P. terrace and the lower (12 m), 95,000-B.P. terrace conform to the age relations and faunal-temperature aspects documented previously in other localities on the Pacific coast of North America. Faunal assemblages from these terraces contain both extralimital northern and southern species, an enigmatic situation not uncommon in East Pacific Pleistocene deposits. However, nearly 50% of the species from the upper terrace are warm-water (subtropical and tropical) taxa, whereas only 5% are cool-water (warm temperate) taxa. Conversely, the lower terrace fauna is composed of 21% extralimital northern taxa, and only a minor (9%) southern, warm-water element.

INTRODUCTION

Pleistocene marine invertebrate faunules from two marine-terrace deposits at Turtle Bay[4], northwestern Baja California Sur, Mexico (Figs. 1, 2), contain distinct warm- and cool-water elements (Emerson, 1980). These faunal differences, in comparison with similar faunal differences known to represent discordant ages elsewhere (Kern, 1977; Kennedy, 1978; Lajoie *et al.*, 1979), suggest that the warmer and cooler water assemblages at Turtle Bay might also represent different ages. To test this hypothesis, we examined the extent of amino-acid racemization in mollusks from each assemblage, and derived estimates of both relative and absolute ages. We also considered the zoogeographic implications of the temporally distinct assemblages (Emerson, 1980).

Amino-acid racemization methods can serve as both relative and semi-quantitative tools for

[1]Department of Invertebrates, American Museum of Natural History, New York, New York 10024

[2]U.S. Geological Survey, Menlo Park, California 94025

[3]Department of Geology, University of Delaware, Newark, Delaware 19711

[4]Turtle Bay (27°41'N., 114°52'W.) is also known as Bahía Tortugas, the port of which is Bahía San Bartolomé or Puerto Bartolomé.